

## REMARKS

Initially, Applicant thanks the Examiner for acknowledging Applicant's claim of foreign priority as well as the receipt of the priority documents.

Claims 31-34 have been amended to recite the subject matter of some of the disclosed embodiments more clearly. Support for the foregoing amendments is found throughout the present application; no new matter has been added.

Claims 31-34 are all the claims pending in the present application, claims 1-30 having been canceled by the Preliminary Amendment dated January 11, 2002. Claim 31 stands rejected under 35 U.S.C. §102(b) as separately anticipated by each of the following: United States Patent (USP) 5,114,586 to Humphrey; USP 3,666,106 to Green; USP 3,543,294 to Boester; and USP 4,501,665 to Wilhelmson. Claims 31 and 33 stand rejected under 35 U.S.C. §102(b) as anticipated by USP 4,254,515 to Kiyama et al. Claims 31-33 stand rejected under 35 U.S.C. §102(b) as anticipated by USP 5,192,428 to Lindstrom. Claims 31 and 34 stand rejected under 35 U.S.C. §102(b) as anticipated by USP 4,904,387 to Jordan. Applicant respectfully traverses the prior art rejections and requests reconsideration and allowance of all the pending claims based upon the following remarks.

Aspects of the present invention relate generally to the treatment and utilization of waste water streams to produce potable or otherwise usable water. The methods described in the present application and recited in the claims avoid inhibiting methanization processes and increase the bio gas yield of bio gas plants while reducing the size thereof. Two types of waste water are generally defined as set forth at pages 3 and 4 of the present application. In particular, black water may contain "[a]most the whole range of pollutants," and may additionally include "pathogenic bacteria from the human intestinal tract" (*see, e.g.* page 8 of the present application). Gray water, on the other hand, "is practically nitrogen-free and phosphorus-free; hence it can be purified to highest quality with relatively little expenditure" (*see, e.g.* the discussion bridging pages 10 and 11 of the present application). As described in the specification and as particularly recited in the pending claims, embodiments of the present invention collect gray water and black water "separately."

Turning now to the prior art, Applicant notes that the asserted references are more deficient than the Examiner acknowledges. As discussed in detail below, the prior art of

record, individually or in combination, is insufficient to anticipate or to render obvious the subject matter recited in the pending claims.

### **The References Cited**

Prior to addressing the specific rejections, Applicant notes some of the salient features of various cited references below.

USP 4,904,387 to Jordan teaches a method and device for recycling waste water generated by various kinds of toilets and urinals (*see, e.g.*, Abstract and column 1, lines 60-64). In the Jordan system, gray water is drained together with the toilet waste water to the treatment facility (column 1, line 64-68). The treatment method generally employs the following:

1. a trap (sand trap) for settling non-organic compounds (column 4, lines 16-18);
2. a pump-sump (column 4, lines 7-9);
3. an anaerobic treatment (column 4, lines 42-43);
4. an aerobic digestion station (column 5, lines 1-5);
5. a grinder pump and filtration system (column 5, lines 37-41) through which portions of the liquid/solid phase are recycled to 1 and/or 3;
6. an adsorption system (column 5, lines 41-44);
7. a disinfection system (column 7, lines 11-16); and
8. a storage tank (column 7, lines 16-18); treated waste water is thus recycled for
9. toilet flushing.

The excess water (due to the treatment of black and gray water) can be discharged at any step after 5 and before 9 (column 7, lines 51-53). Consequently, the treatment steps 1 through 5 as contemplated by Jordan are treating domestic waste water. Generally, the system presented by Jordan is used to *eliminate* nitrogen compounds, whereas those of skill in the art will appreciate that the pending claims recite methods designed to *concentrate and re-claim* nitrogen compounds.

USP 3,543,294 to Boester teaches a method and device for recycling gray water generated by households excluding toilets; recycled water may be used for all household toilet flushing (*see* Abstract). Furthermore, the toilet waste water is treated and discharged. The treatment method generally employs the following:

1. a separate collection and drainage of gray water (column 1, lines 55-56);
2. a liquid/solid separation of gray water (column 1, lines 56-57);

3. an aerobic treatment (column 1, lines 60-63);
4. a pump station and a pressure tank (*see, e.g.*, column 1, lines 64-65, and column 2, line 1);
5. either re-usage for toilet flushing (column 2, lines 2-5), or a bypass of excess gray water to the treatment tank of black water (column 2, lines 5-8);
6. a separate collection and drainage of black water (column 2, lines 12-13);
7. a liquid/solid separation of black water (column 2, lines 13-14);
8. an aerobic treatment of black water (column 2, lines 14-16); and
9. discharge of the treated black and gray water mixture.

Applicant submits that the *aerobic* treatment of the waste water in Boester is different from the *anaerobic* treatment described and claimed in the pending application.

USP 3,666,106 to Green teaches a method and device for treating and disposing of black water and gray water (*see*, Abstract). The treatment method generally employs the following:

1. a separate collection and drainage of black water out of flush toilets (Fig. 1);
2. an anaerobic treatment of the black water (column 1, lines 51-52, column 2, lines 74-75);
3. an aerobic treatment of the product of 2, optionally mixed with parts of gray water (column 3, lines 30-48); and
4. an ultraviolet purification of the product of 3, optionally mixed with low polluted parts of gray water, and chemical treatment and activated carbon treatment (column 3, line 49 through column 4, line 5).

The Green reference neither teaches nor suggests liquid/solid separation of gray water and/or black water or faecal drains and/or urine drains as recited in the pending claims.

USP 4,254,515 to Kiyama et al. teaches a method and device for a compost type toilet (*see*, Abstract). The treatment method generally employs the following:

1. combined collection and drainage of feces and urine (Fig. 1);
2. a liquid/solid separating means for separating the liquids (urine and flushing water) from the solids (*see*, Abstract);
3. an aerobic composting of the feces with an auxilliary agent (column 1, line 62, and column 2, lines 57-63) such as peat moss (column 7, lines 37-38); and

4. a vaporization of the liquids (*see*, Abstract).

The method described in the reference is employed in conjunction with dry toilets, where the separation of faecal matter with flush water (brown water) and urine (yellow water) does not occur. Consequently, the Kiyama patent neither teaches nor suggests an urine separation toilet, nor does it contemplate “separately collecting” the different types of waste water as described and claimed in the present application.

USP 5,129,428 to Lindstrom teaches a method and device for treating human urine and feces in a transportable rest station (column 1, lines 31-33). The treatment method generally employs the following:

1. a separate collection and drainage of feces and urine out of urine separating dry toilets (Fig. 1);
2. an aerobic composting of the feces (column 3, line 34, through column 4, line 12); and
3. an aerobic treatment of the urine (column, lines 13-50).

The Lindstrom patent describes a system for dry toilets where black water is not generated. Consequently, the reference neither teaches nor suggests treatment of black water as described and claimed in the present application.

#### **The Rejections Under 35 U.S.C. §102(b)**

Claim 31 stands rejected under 35 U.S.C. §102(b) as separately anticipated by each of the following: Humphrey; Green; Boester; and Wilhelmson. The various patents to Humphrey, Green, Boester, and Wilhelmson, however, each describe collection of black water with liquid/solid separation occurring through mechanisms (*e.g.*, by gravity, filter bag, and sieve basket) which are distinct from the membrane filtration recited in claim 31. Membrane filtration is the only method of liquid/solid separation which can filter 100% of the pathogen bacteria possibly present in black water. None of the references cited teaches a membrane filtration technique for liquid/solid separation; accordingly, the references are insufficient to anticipate claim 31.

Claims 31 and 33 stand rejected under 35 U.S.C. §102(b) as anticipated by the Kiyama patent. As set forth above, however, the Kiyama reference discloses a method and device for use in conjunction with a compost type toilet, and not a urine separation toilet; accordingly, the Kiyama patent fails to teach at least the “collecting” element recited in claim 33. As a result of

the toilet design for which the treatment system has utility, the Kiyama system treats faecal matter without flushing water. Furthermore, in accordance with the teachings of the Kiyama patent, solids are treated *aerobically*, and not *anaerobically* as recited in claims 31 and 33. As the Kiyama patent is deficient at least with respect to the “anaerobic fermentation” element, the reference is insufficient to anticipate claims 31 and 33.

Claims 31-33 stand rejected under 35 U.S.C. §102(b) as anticipated by Lindstrom. As described above, the Lindstrom reference discloses a method which treats the solids *aerobically* by composting. In accordance with the embodiments recited in claims 31-33, treatment of the solids occurs *anaerobically*, which facilitates bio gas production. In that regard, the Lindstrom patent fails to teach or even to suggest at least the “anaerobic fermentation” element called out in each of claims 31-33; accordingly, the rejection under 35 U.S.C. §102(b) is improper.

Claims 31 and 34 stand rejected under 35 U.S.C. §102(b) as anticipated by USP 4,904,387 to Jordan. As set forth above, the first solid/liquid separation step disclosed in the Jordan patent employs a settling trap for non-organic compounds. In pending claims 31 and 34, however, the first solid/liquid separation operation separates the organic solids using a membrane filtration procedure which is neither taught nor suggested by Jordan.

With respect to the sand trap described in the Jordan patent, Applicant notes that the retention time of liquids in such traps is normally several minutes, whereas the retention time for settling organic solids is in the region of hours. Accordingly, a sand trap (such as disclosed in the cited reference) and liquid/solid separation techniques for organic solids (such as the membrane filtration recited in pending claims 31 and 34) represent two different methods and technologies.

In that regard, the sand trap in the Jordan patent allows solids to settle; clearly the sand trap precludes flotation processes. As a consequence of the sand trap, the Jordan system and method contemplate that “nitrates can be further reduced without increasing toilet usage” (column 6, lines 64-65). In contrast, the liquid/solid separation techniques described and claimed in the present application make use of evolving gases (such as N<sub>2</sub> and CO<sub>2</sub>) during nitrification. These gases adsorb as fine bubbles to suspended solids, resulting in flotation. Applicant submits that the liquid/solid separation technology employed by the methods disclosed and claimed in the present application are clearly distinguishable over the sand trap

system taught in Jordan. Failing to teach at least a membrane filtration technique for liquid/solid separation, the Jordan patent is insufficient to anticipate claims 31 and 34.


**CONCLUSION**

Based upon the foregoing analysis, Applicants respectfully submit that claims 31-34 are allowable at least for the reasons set forth above, and that the present application is currently in condition for allowance. Early notification to that effect is solicited. The Examiner is encouraged to contact the undersigned at (858) 509-4007 if it is believed that a discussion will expedite prosecution of this case.

Applicants believe that a fee is required at this time. Please apply any charges or credit any overpayments to Deposit Account No. 03-3975.

Respectfully Submitted,  
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